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FORM PTO-1390 REV. 5-93		US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEYS DOCKET NUMBER <b>P98,1428</b>
<b>TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371</b>			U.S. APPLICATION NO. (if known, see 37 CFR 1.5)
INTERNATIONAL APPLICATION NO. <b>PCT/DE 97/00205</b>	INTERNATIONAL FILING DATE <b>3 FEBRUARY 1997</b>	PRIORITY DATE CLAIMED <b>6 FEBRUARY 1996</b>	
TITLE OF INVENTION <b>"DIGITAL SIGNAL TRANSMISSION SYSTEM"</b>			
APPLICANT(S) FOR DO/EO/US <b>WOLFGANG FRAAS and KLAUS HUNLICH</b>			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ul style="list-style-type: none"><li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</li><li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li><li>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.</li><li>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</li><li>5. <input checked="" type="checkbox"/> A copy of International Application as filed (35 U.S.C. 371(c)(2))<ul style="list-style-type: none"><li>a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</li><li>b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau.</li><li>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US)</li></ul></li><li>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</li><li>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))<ul style="list-style-type: none"><li>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</li><li>b. <input type="checkbox"/> have been transmitted by the International Bureau.</li><li>c. <input checked="" type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li><li>d. <input type="checkbox"/> have not been made and will not be made.</li></ul></li><li>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</li><li>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</li><li>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</li></ul>			
<b>Items 11. to 16. below concern other document(s) or information included:</b>			
<ul style="list-style-type: none"><li>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98;</li><li>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.</li><li>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.<ul style="list-style-type: none"><li><input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</li></ul></li><li>14. <input type="checkbox"/> A substitute specification.</li><li>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</li><li>16. <input checked="" type="checkbox"/> Other items or information:<ul style="list-style-type: none"><li>a. <input checked="" type="checkbox"/> Submission of Drawings</li><li>b. <input checked="" type="checkbox"/> <b>EXPRESS MAIL # EM156043530US</b></li></ul></li></ul>			

U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.5)		INTERNATIONAL APPLICATION NO. <b>PCT/DE 97/00205</b>		<div style="font-size: 1.2em; font-weight: bold;">09117799.</div> ATTORNEY'S DOCKET NUMBER <b>P98,1428</b>	
<div>17. <input checked="" type="checkbox"/> The following fees are submitted:</div> <div style="margin-top: 10px;"><b>BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5):</b> Search Report has been prepared by the EPO or JPO ..... \$930.00  International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) ... \$720.00  No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) ..... \$790.00  Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO ..... \$1070.00  International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... \$ 98.00  <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b></div>				CALCULATIONS	PTO USE ONLY
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).				\$ 0	
Claims	Number Filed	Number Extra	Rate		
Total Claims	4 - 20 =	0	X \$ 22.00	\$ 0	
Independent Claims	1 - 3 =	0	X \$ 82.00	\$ 0	
Multiple Dependent Claims 0			\$270.00 +	\$	
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$ 930.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)				\$	
<b>SUBTOTAL =</b>				\$ 930.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
<b>TOTAL NATIONAL FEE =</b>				\$ 930.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). \$40.00 per property				\$	
<b>TOTAL FEES ENCLOSED =</b>				\$ 930.00	
				Amount to be refunded	\$
				charged	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>930.00</u> to cover the above fees is enclosed.					
b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.					
c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>08-2290</u> . A duplicate copy of this sheet is enclosed.					
<b>NOTE:</b> Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
<b>SEND ALL CORRESPONDENCE TO:</b>					
<b>Hill Steadman &amp; Simpson</b> <b>A Professional Corporation</b> <b>85th Floor Sears Tower</b> <b>Chicago, Illinois 60606</b>			<div style="font-size: 1.2em; font-family: cursive;">Steven H. Noll</div> <b>SIGNATURE</b>		
			NAME - STEVEN H. NOLL		
			28,982		
			Registration Number		

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

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Date of Deposit: August 6, 1998

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Wolfgang Fraas *et al*

PCT - Form 1390 (in duplicate)  
Preliminary Amendment  
Copy of Specification  
Submission of Drawings - 1 Sheet (Figs. 1-3)  
Declaration and Power of Attorney  
Check for \$ 930.00  
Information Disclosure Statement  
Form 1449  
Copy of Search Report  
6 references

Assignment - Under Separate Cover  
Check for \$40.00

(Attorney's Docket No. P98,1428)

*Indenlin*

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IN THE UNITED STATES ELECTED OFFICE UNDER THE  
PATENT CORPORATION TREATY CHAPTER II

PRELIMINARY AMENDMENT

APPLICANT: Wolfgang Fraas et al. ATTORNEY DOCKET NO: P98,1428

SERIAL NO.: GROUP ART UNIT:

FILED: EXAMINER:

TITLE: "DIGITAL SIGNAL TRANSMISSION SYSTEM"

PCT APPLICATION NO. : PCT/DE 97/00205 PCT FILING DATE: February 3, 1997

Hon. Assistant Commissioner for Patents,  
Washington, D.C. 20231

S I R:

IN THE SPECIFICATION

On page 1, line 2, insert --TITLE OF THE INVENTION--;

line 3, replace "system" with --System--, replace "for" with --For--, insert --The--, before "transmission", replace "transmission" with --Transmission--, replace "digital" with --Digital--, replace "signals" with --Signals--;

line 5, after "The", insert --present--, after "relates" insert --generally to the field of telecommunications and, more specifically, the present invention is directed--

line 9, insert --DESCRIPTION OF THE RELATED ART--;

line 12, delete "thus".

On page 2, line 9, replace "standardly" with --typically--;

line 18, replace "apparatuses" with --devices--;

line 19, replace "apparatuses" with --equipment--;

line 20, replace "required" with --necessary--;

line 21, delete "standardly";

line 24, replace "hereby" with --therefore--;

line 30, after "is" insert --then--;

line 31, delete "standardly".

On page 3, line 13, delete "in", delete "[sic]";

line 21, replace "The" with --One--, replace "indicate" with --provide--;

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delete lines 26-28.

line 30, after "the" insert --present--, replace "indicated" with --provided--;

line 33, replace ",", with --.--, delete "in which", replace "a" with --A--.

On page 4, line 1, replace "," with --, after ".", replace, "said means serving for the conversion of" with --This mechanism converts--;

line 3, replace "," with --performs--;

line 9, replace "It is thereby enabled that" with --In this system--;

line 11, delete "that";

line 16, replace "possible" with --achieved--;

line 33, delete "respectively".

On page 6, line 18, insert --BRIEF DESCRIPTION OF THE DRAWINGS--;

line 19, delete "In the following", replace "the" with --The--.

lines 19-20, delete "on the basis of embodiments", after "figures", insert --wherein:--;

line 22, replace "shows, on the basis of" with --is--, delete "switching", before "a", second occurrence, insert --illustration of--;

line 25, replace "shows, on the basis of", with --is--, delete "switching", before "a", second occurrence, insert --illustration of--;

line 29, replace "shows a" with --illustrates a--.

On page 7, before line 1, insert --DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS--;

line 1, replace "shows" with --is--;

lines 34-35, replace "inessential for the invention" with --known by those of ordinary skill in the art--.

On page 9, line 29, replace "," with --.--, before "couples", insert --This design--, replace "this" with --the--;

line 30, delete "(not shown in more detail)".

## **IN THE CLAIMS**

1. [Transmission] A transmission system for [transmission of] transmitting digital signals, [present] in [the form of] time-division multiplex channels[,] between an exchange termination [(ET)] and a line termination [(LT), characterized in that] wherein both the exchange termination [(ET)] and the line termination [(LT)] respectively have a means [(IWF)] for [connection] connecting to a user interface [(UNI)] of an ATM network [(ATMN), in order to convert] and means for converting [the] time-division multiplex data into ATM cells, or[, respectively, to convert the] ATM cells into time-division multiplex data, [whereby] and a means for allocating a virtual ATM channel [is allocated] to each time-division multiplex channel.

2. [Transmission] A transmission system according to claim 1, [with] further comprising a switching device [(PBX)] for switching time-division multiplex digital signals [and with several] between a plurality of exchange terminations [(ET)], [characterized in that several] wherein the plurality of exchange terminations [(ET)] of the switching device are connected to a single user interface [(UNI)] of an ATM network [(ATMN)].

3. [Transmission] A transmission system according to claim 2, [characterized in that] wherein all exchange terminations [(ET)] of the switching device are connected to a single user interface [(UNI)] of [an] the ATM network [(ATMN)].

4. [Transmission] A transmission system according to claim 1 [one of the preceding claims], [characterized in that] wherein the means [(IWF)] for converting time-division multiplex data and ATM cells contains a channel multiplexer/demultiplexer [(C-M/DM), in order to distribute the] for distributing digital signals of the individual time-division multiplex channels to the respectively allocated ATM cells, or[, respectively, to recuperate them] the digital signals from the ATM cells and distribute them into the allocated time-division multiplex channels; said system further comprising an ATM converter [(ATMC)] for packing items of digital information received from the channel multiplexer/demultiplexer [(C-M/DM)] into ATM cells or, respectively, for unpacking ATM cells and emitting the digital information contained therein to the channel

multiplexer/demultiplexer [(C-M/DM)], and for [insertion of] inserting ATM cells from this cell stream, and [contains] an interface [(IF-STM1)] [in order to pass an item of] for passing synchronization information of the time-division multiplex signals to the ATM network [(ATMN)] or, respectively, to receive [this] synchronization information from the ATM network [(ATMN), evaluate it,] and pass it to the ATM converter [(ATMC)] and to the channel multiplexer/demultiplexer [(C-M/DM)].

### **REMARKS**

Applicant respectfully requests entry of this Preliminary Amendment prior to examination of this application.

Submitted by,

Steven H. Noll (Reg. 28,982)

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### **CERTIFICATE OF MAILING**

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STEVEN H. NOLL (Reg. No. 28,982)

Name of Applicant's Attorney

Steven H. Noll

Signature

August 6, 1998

Date

## Specification

Transmission system for transmission of digital signals

5 The invention relates to a transmission system for transmission of time-multiplex-channel-type digital signals between a switching terminal device (exchange termination) and a line termination.

10 According to the terminology of the ITU-T G.960 standard (3/93), "access digital section for ISDN basic rate access," in particular pages 2 and 3, the invention thus relates to a data transmission at the V reference point. The data transmission at the V reference point takes place according to the ITU-T recommendation G.960, in particular page 2, Figure 1/G.960 and page 3, Figure 2/G.960 with associated specification, and also Figures 5/G.960 and 6/G.960 on page 9, with associated specification concerning functional elements between state automata. In practical application, the transmission takes place according to an industrial standard used by several semiconductor manufacturers, called IOM<sup>®</sup>-2 as an abbreviation of the expression "ISDN Oriented Modular Interface." As can be seen in the company publication of the semiconductor manufacturer Siemens, "ICs for Communications, IOM<sup>®</sup>-2 Interface Reference Guide," in particular chapter 2, 25 "Global Picture," pages 6 to 12, as well as Figure 2 on page 8, time multiplex frames of 125  $\mu$ m length are hereby transmitted. Such a frame is partitioned into sub-frames, called channels CH0, CH1, ..., which are respectively 30 allocated to a connection and thus form a connection frame. In the described IOM<sup>®</sup>-2 interface standard, such a connection



frame contains, again in time-division multiplex form, four time-division multiplex channels, i.e., two useful channels B1 and B2, a monitor channel and a control information channel. In the IOM<sup>®</sup>-2 standard, these channels are chronologically arranged within the connection frame in such a way that the control information channel is transmitted last. The mentioned time-division multiplex channels each contain an 8-bit word. Consequently, four 8-bit words are transmitted quasi-simultaneously, i.e., within a connection frame cycle.

A transmission system for the transmission of digital signals between an exchange termination and a line termination is standardly part of a communication apparatus with a switching device and with a subscriber terminal means, whereby the switching device is coupled to the subscriber terminal means via an exchange termination and via a line termination. Such a communication apparatus serves to set up or, respectively, dismantle narrow-band communication connections between subscriber terminal means, and to enable a narrow-band communication (speech, audio, narrow-band video, text, facsimile, and/or data communication). Modern communication apparatuses hereby make use of a digital transmission technology, e.g. ISDN. In such communication apparatuses, it is required to connect the subscriber terminal units with the switching devices via lines. This standardly takes place via metallic line pairs. In a communication apparatus with many subscriber terminal units, an extensively branched line network is hereby required.

If the service provided to a subscriber terminal unit by a communication apparatus is to be moved from a location inside

the communication apparatus to another location, a reconfiguration of the metallic connection lines between the switching device and the subscriber terminal unit is standardly required.

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In many areas, nowadays a broadband communication apparatus, e.g. a local data network LAN, is additionally installed alongside a narrow-band communication apparatus. Such a local data network can for example also be constructed in the form of an emulated LAN on the basis of an ATM network. However, an ATM network is often installed independent of the construction of individual local data networks, in order to connect several local data networks.

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ATM hereby stands for asynchronous transfer mode. ATM networks are described in (among other places) the book ATM Networks, Rainer Händl, Manfred N. Huber, Stefan Schröder, Edison Wessley Publishing Company, 2nd ed., 1994, in particular in Chapter 4, pages 21 to 54. Within an ATM network, data, packed into ATM cells, are transmitted in a continuous in ATM cell stream [sic] via virtual channels of virtual paths. The transmission takes place in connection-oriented fashion. Subscribers can be connected via user interfaces, known as UNI (user-network interface), determined unambiguously by means of an identifier of the virtual path VPI (Virtual Path Identifier) and by an identifier VCI of the virtual channel (Virtual Channel Identifier).

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The object of the present invention is to indicate a transmission system that enables, with an ATM network, the

realization of a narrow-band communication system that is simple to install and simple to configure.

The invention achieves this object by means of a transmission system having the features of patent claim 1. Advantageous constructions are the subject matter of subclaims.

According to the invention, a transmission system is indicated for the transmission of digital signals, present in the form of time-division multiplex channels, between an exchange termination and a line termination, in which a means for connection to a user interface of an ATM network is respectively provided both for the exchange termination and for the line termination, said means serving for the conversion of the time-division multiplex data into ATM cells or, respectively, the conversion of the ATM cells into time-division multiplex data. Such a transmission system contributes to the solution of the object named above in that a virtual ATM channel is allocated to each time-division multiplex channel.

It is thereby enabled that the time-division multiplex data of the individual time-division multiplex channels can be inserted into an ATM cell stream, and that the cell stream can be distributed within the ATM network using administrative measures -- namely, unambiguous allocation of a VPI address/VCI address of the ATM network to a time-division multiplex channel. Modifications of the distribution within the ATM network are very easily possible by this means, since, given for example a relocation of a subscriber from the region of a user interface of the ATM network into the region of

another user interface of the ATM network, only the allocation of the VPI address/VCI address has to be changed. Moreover, by means of a transmission system as specified the problem of a physically caused range limitation between a switching device and a terminal apparatus is removed in a communication apparatus, since the user interface can be brought to a subscriber terminal unit or, respectively, to a switching device as needed.

If an ATM network is already present in a region in which a narrow-band communication apparatus is to be installed, the large-scale distribution of the information of the narrow-band communication can take place via the ATM network, and the distance between the network termination and the line termination can respectively be very small. If the ATM network for example offers the possibility of a connection between user interfaces that are arranged at a great distance from one another, subscriber terminal means that are correspondingly removed from one another can also be connected to a narrow-band switching apparatus. For example, by modification of the address allocations in the ATM network, calls coming into extensively branched company networks can be routed as needed (e.g., dependent on the time of day) to different terminal apparatuses, or line groups located at a distance from one another.

A development of the inventive transmission system is formed by a communication apparatus with a switching device for time-division multiplex digital signals, and having several exchange terminations. Several exchange terminations are hereby preferably connected to a single user interface of an

ATM network. Dependent on the number of exchange terminations and the bandwidth provided by the user interface, at best all exchange terminations of the switching device can be connected to a single user interface of the ATM network.

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A means for converting time-division multiplexing data and ATM cells preferably contains a channel multiplexer/demultiplexer for distributing the digital signals of the individual time-division multiplex channels to the respectively allocated ATM cells or, respectively, for the recuperation of the digital signals from the ATM cells and distribution into the allocated time-division multiplexing channels. Moreover, such a means provides an ATM converter for packing items of digital information obtained from the channel

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multiplexer/demultiplexer into ATM cells or, respectively, for unpacking ATM cells and giving the items of digital information contained therein to the channel

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multiplexer/demultiplexer, as well as for inserting ATM cells into a cell stream of the ATM network or, respectively, for removing ATM cells from this cell stream. In addition, a corresponding converter means preferably contains an

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interface, e.g. an STM1 interface, in order to pass an item of synchronization information of the time-division multiplex signals to the ATM network, or, respectively, to receive such information from the ATM network, evaluate it, and pass it to the ATM converter and to the channel multiplexer/demultiplexer.

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A transmission system as described above ensures that items of information concerning the line status between a line termination and the allocated network terminal of a subscriber

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terminal means are transmitted to the exchange termination via the V reference point in the context of the standard time-division multiplex signaling. Moreover, the described construction of the conversion means ensures that the time-division multiplex signals are synchronized in the region of the subscriber terminal unit and in the region of the switching device.

In the following, the invention is explained in more detail on the basis of embodiments, with reference to the figures.

Fig. 1 shows, on the basis of a block switching diagram, an embodiment of an inventive transmission system;

Fig. 2 shows, on the basis of a block switching diagram, a communication apparatus as an example of the application of an inventive transmission system; and

Fig. 3 shows a transmission path between the subscriber terminal equipment and exchange termination according to ITU-T G.960, including an inventive transmission system in the region of the  $V_1$  reference point.

Fig. 1 shows a block switching diagram of an inventive transmission system with an exchange termination ET and a line termination LT, respectively connected to a user interface UNI of an ATM network ATMN via a means IWF for converting time-division multiplex data and ATM cell data. The exchange termination ET shown contains a line driver circuit (line card) LINE-C, which for example provides an IOM<sup>®</sup>-2 interface to

the line termination. The line termination LT contains an ISDN interface ISDN-IF, which provides a corresponding IOM<sup>®</sup>-2 interface to the exchange termination ET. The two converter means IWF shown respectively serve for the conversion of time-division multiplex data into ATM cell data, as well as of ATM cell data into time-division multiplex data, and respectively contain a channel multiplexer/demultiplexer C-M/DM, in order to distribute the digital signals of the individual time-division multiplex channels to the respectively allocated ATM cells, or, respectively, to recuperate them from the ATM cells and distribute them into the allocated time-division multiplex channels. Moreover, these means IWF respectively contain an ATM converter ATMC for packing items of digital information received from the channel multiplexer/demultiplexer C-M/DM in ATM cells or, respectively, for unpacking information from ATM cells and giving it to the channel multiplexer/demultiplexer C-M/DM, and for the insertion of ATM cells into a cell stream of the ATM network ATMN, via the respective user interface UNI, and for removing ATM cells from a cell stream of the ATM network ATMN. In addition, an interface IF-STM1 is contained in each means IWF, in order to pass an item of synchronization information of the time-division multiplex signals to the ATM network ATMN, or, respectively, to receive it from the ATM network ATMN, evaluate it, and pass it to the ATM converter ATMC and to the channel multiplexer/demultiplexer C-M-DM.

The design of the ATM network is inessential for the invention, and thus is not explained in detail here.

The means IFW for converting time-division multiplex data and ATM cells can be realized both as an independent means between

the line termination LT and the allocated user interface UNI  
of the ATM network ATMN, and also as an input arrangement of  
the user interface UNI or as an output arrangement of the line  
termination LT. Correspondingly, it can also be realized as  
5 an output arrangement of an exchange termination ET, or as an  
intermediately connected arrangement.

Fig. 2 shows an inventive transmission system with a switching  
device PBX for setting up and dismantling narrow-band  
10 connections between communication terminal apparatuses (not  
shown), which can be connected via subscriber terminal means  $S_0$   
in the exemplary embodiment shown. The switching device PBX  
contains at least one exchange termination ET that is  
connected with a user interface UNI of the ATM network ATMN,  
likewise shown, via a means IWF for converting time-division  
multiplex data and ATM cell data. Among other things, the ATM  
network ATMN contains a switching node ATM-hub, and several  
ATM add/drop multiplexers ATM-DMX, to which user interfaces  
UNI, as well as other networks, such as e.g. local networks  
20 LAN or public narrow-band communication networks ISTN, can be  
connected, as is shown in Fig. 2. If, in the ATM network ATMN  
shown in Fig. 2, user interfaces UNI are represented as  
immediately following the switching nodes ATM-hub or,  
respectively, the ATM add/drop multiplexer ATM-DMX, this has  
25 no effect on the actual form of the realization of the ATM  
network, but rather merely illustrates the arrangement of the  
individual elements in relation to an information flow.

The subscriber terminal devices  $S_0$  shown in Fig. 2 are  
30 respectively coupled to the user interfaces UNI via a line



termination LT and a means IWF for converting time-division multiplex data and ATM cell data.

As can be seen from Fig. 2, a transmission system according to the invention enables a simple realization of a narrow-band communication apparatus, in which the installation of terminal lines is required only between user interfaces UNI of the ATM network ATMN and subscriber terminal units  $S_0$ , or, respectively, between the switching device PBX and a user interface UNI of the ATM network ATMN.

In Fig. 2, only one exchange termination ET, which is connected with a user interface UNI of the ATM network ATMN, is shown in the switching device PBX. Of course, for each line segment LT to be connected, and for trunk connections to global communication networks ISTN, an exchange termination ET can respectively be provided, which is connected to a user interface UNI of the ATM network ATMN via a separate user interface UNI, or is so connected in common with other exchange terminations ET.

As can be seen from the structure shown in Fig. 2, the allocation of individual exchange terminations ET and line terminations LT can be determined by the ATM network ATMN, so that a reconfiguration of individual line terminations LT is possible by means of simple administrative measures.

Fig. 3 shows a variant of the representation designated Fig. 1/G.960 in the above-mentioned standard ITU-T G.960, which variant connects a subscriber terminal apparatus TE (terminal equipment) to a network termination NT1 via a reference point

T, couples this network terminal NT1 to a line termination LT via a digital transmission path (not shown in more detail), and connects this line termination LT to an exchange termination ET via a reference point  $V_1$ . In Fig. 3, in addition to the figure shown in ITU-T G.960, an inventive realization of the reference point  $V_1$  with an ATM network ATMN with user interfaces UNI is shown, as well as with means IWF for connecting the line termination LT and the exchange termination ET to the ATM network ATMN, in order to convert the time-division multiplex data and the ATM cell data.

Patent claims

1. Transmission system for transmission of digital signals,  
present in the form of time-division multiplex channels,  
5 between an exchange termination (ET) and a line termination  
(LT), **characterized in that** both the exchange termination (ET)  
and the line termination (LT) respectively have a means (IWF)  
for connection to a user interface (UNI) of an ATM network  
(ATMN), in order to convert the time-division multiplex data  
10 into ATM cells, or, respectively, to convert the ATM cells  
into time-division multiplex data, whereby a virtual ATM  
channel is allocated to each time-division multiplex channel.

2. Transmission system according to claim 1, with a switching  
device (PBX) for time-division multiplex digital signals and  
with several exchange terminations (ET), **characterized in that**  
several exchange terminations (ET) of the switching device are  
connected to a single user interface (UNI) of an ATM network  
(ATMN).

3. Transmission system according to claim 2, **characterized in**  
**that** all exchange terminations (ET) of the switching device  
are connected to a single user interface (UNI) of an ATM  
network (ATMN).

4. Transmission system according to one of the preceding  
claims, **characterized in that** the means (IWF) for converting  
time-division multiplex data and ATM cells contains a channel  
multiplexer/demultiplexer (C-M/DM), in order to distribute the  
30 digital signals of the individual time-division multiplex  
channels to the respectively allocated ATM cells, or,

respectively, to recuperate them from the ATM cells and distribute them into the allocated time-division multiplex channels, an ATM converter (ATMC) for packing items of digital information received from the channel

5 multiplexer/demultiplexer (C-M/DM) into ATM cells or, respectively, for unpacking ATM cells and emitting the digital information contained therein to the channel

multiplexer/demultiplexer (C-M/DM), and for insertion of ATM cells into a cell stream of the ATM network (ATMN) or,

10 respectively, for removal of ATM cells from this cell stream, and contains an interface (IF-STM1) in order to pass an item of synchronization information of the time-division multiplex signals to the ATM network (ATMN) or, respectively, to receive this information from the ATM network (ATMN), evaluate it, and pass it to the ATM converter (ATMC) and to the channel  
5 multiplexer/demultiplexer (C-M/DM).

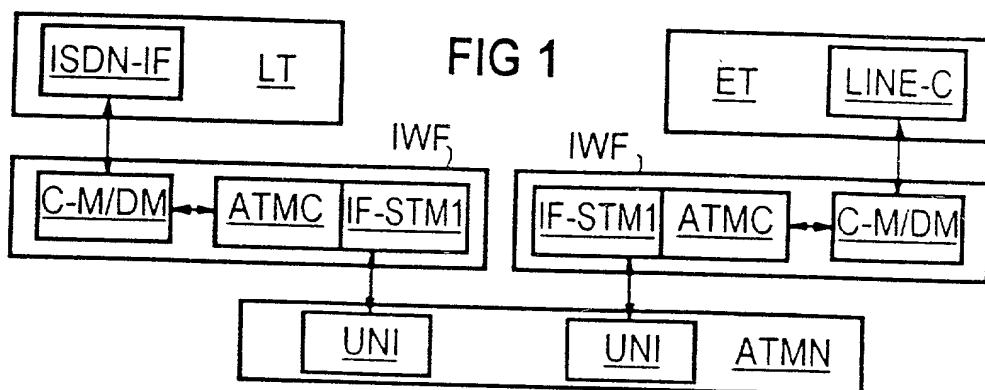
## Abstract

### Transmission system for transmission of digital signals

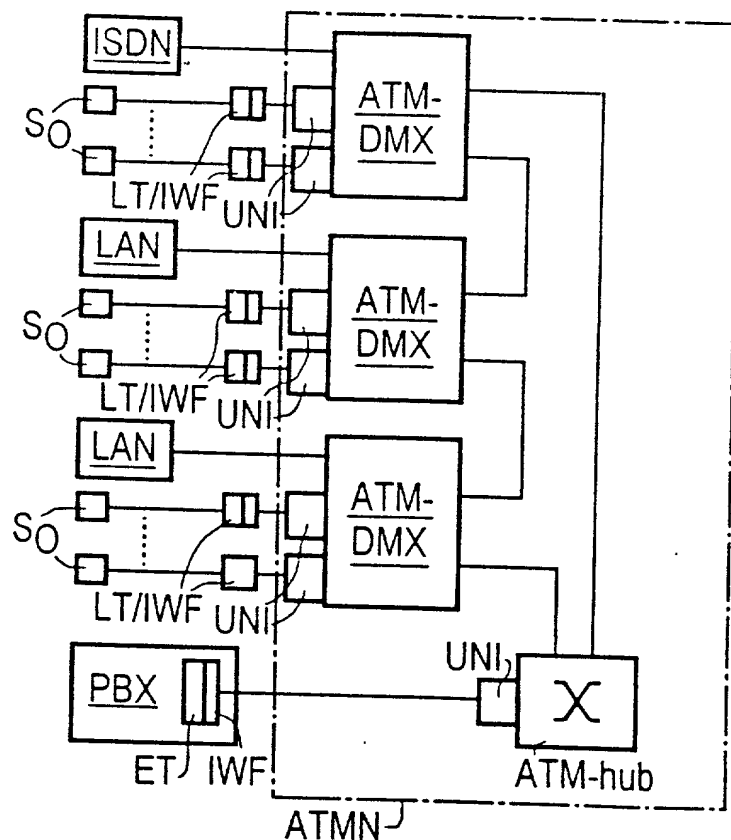
5      Transmission system for the transmission of digital signals,  
present in the form of time-division multiplex channels,  
between an exchange termination (ET) and a line termination  
(LT). Both the exchange termination (ET) and the line  
termination (LT) is respectively connected to a user interface  
10      (UNI) of an ATM network (ATMN) via a means (IWF) for  
converting time-division multiplex data into ATM cells or,  
respectively, from ATM cells into time-division multiplex  
data, whereby a virtual ATM channel is allocated to each time-  
division multiplex channel using this means.

Fig. 1

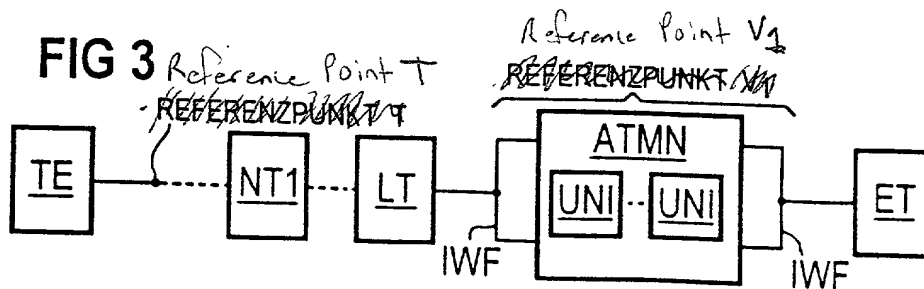
1 / 1



**FIG 2**



**FIG 3**



# Declaration and Power of Attorney For Patent Application

## *Erklärung Für Patentanmeldungen Mit Vollmacht*

### German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Übertragungssystem zur Übertragung  
von Digitalsignalen

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

deren Beschreibung

the specification of which

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

(check one)

☐ is attached hereto.

☐ am \_\_\_\_\_ als

☐ was filed on \_\_\_\_\_ as

PCT internationale Anmeldung

PCT international application

PCT Anmeldungsnummer \_\_\_\_\_

PCT Application No. \_\_\_\_\_

eingereicht wurde und am \_\_\_\_\_

and was amended on \_\_\_\_\_

abgeändert wurde (falls tatsächlich abgeändert).

(if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

09117799.080698

## German Language Declaration

Prior foreign applications  
Priorität beansprucht

Priority Claimed

196 04 244.5 Germany

06. Februar 1996

☒

☐

(Number)  
(Nummer)

(Country)  
(Land)

(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)

Yes  
Ja

No  
Nein

(Number)  
(Nummer)

(Country)  
(Land)

(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)

☐

Yes  
Ja

☐

No  
Nein

(Number)  
(Nummer)

(Country)  
(Land)

(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)

☐

Yes  
Ja

☐

No  
Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)  
(Anmeldeseriennummer)

(Filing Date)  
(Anmeldedatum)

(Status)  
(patentiert, anhängig,  
aufgegeben)

(Status)  
(patented, pending,  
abandoned)

(Application Serial No.)  
(Anmeldeseriennummer)

(Filing Date)  
(Anmeldedatum)

(Status)  
(patentiert, anhängig,  
aufgeben)

(Status)  
(patented, pending,  
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



## German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842), Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

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Voller Name des einzigen oder ursprünglichen Erfinders: <b>FRAAS, Wolfgang</b>		Full name of sole or first inventor:	
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Staatsangehörigkeit <b>Bundesrepublik Deutschland</b>		Citizenship	
Postanschrift <b>Karwendelstraße 2</b>		Post Office Address	
<b>D-82515 Wolfratshausen</b>			
<b>Bundesrepublik Deutschland</b>			
Voller Name des zweiten Miterfinders (falls zutreffend): <b>HÜNLICH, Klaus</b>		Full name of second joint inventor, if any:	
Unterschrift des Erfinders 	Datum <b>27.01.97</b>	Second Inventor's signature	Date
Wohnsitz <b>D-85467 Neuching, Germany</b>		Residence <b>DEX</b>	
Staatsangehörigkeit <b>Bundesrepublik Deutschland</b>		Citizenship	
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<b>D-85467 Neuching</b>			
<b>Bundesrepublik Deutschland</b>			

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

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